

Application Number 10/534,633  
Amendment dated May 24, 2007  
Response to Office Action of February 28, 2007

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**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1 (currently amended): A thermotunneling device comprising a collector electrode at which electrons are collected and an emitter electrode from which electrons are emitted, said collector electrode having a surface facing said emitter electrode, characterized in that an insulator layer covers said surface of said collector electrode and is separated from said emitter electrode by a distance  $d_1$ , wherein  $d_1$  is greater than zero.

Claim 2 (original): The thermotunneling device of claim 1 in which the insulator layer comprises a metal oxide.

Claim 3 (original): The thermotunneling device of claim 2 in which the metal oxide is aluminum oxide.

Claim 4 (currently amended): The thermotunneling device of claim 1 in which a distance between said emitter electrode from which electrons are emitted and said collector electrode at which electrons are collected is in the range of 10 - 200Å.

Claim 5 (original): The thermotunneling device of claim 1 in which  $d_1$  is in the range of 5 - 50Å

Claim 6 (original): The thermotunneling device of claim 1 in which the emitter electrode comprises a metal.

Claim 7 (original): The thermotunneling device of claim 1 in which the collector electrode comprises a metal.

Claim 8 (currently amended): A method for enhancing electron tunneling between an emitter electrode from which electrons are emitted and collector electrode at which electrons are collected, said collector electrode having a surface facing said emitter electrode, comprising the step of covering said surface of said collector electrode with an insulator wherein said insulator is separated from said emitter electrode by a distance  $d_1$ , wherein  $d_1$  is greater than zero.

Claim 9 (original): The method of claim 8 in which the insulator layer comprises a metal oxide.

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Claim 10 (original): The method of claim 9 in which the metal oxide is aluminum oxide.

Claim 11 (currently amended): The method of claim 8 in which said covering step comprises placing the insulator between 5 and 50Å from ~~[[the]]~~ said emitter electrode.

Claim 12 (original): The method of claim 8 additionally comprising the step of placing the collector electrode between 10 and 200Å from the emitter electrode.

Claim 13 (original): The method of claim 8 in which the emitter electrode comprises a metal.

Claim 14 (original): The method of claim 8 in which the collector electrode comprises a metal.

Claim 15 (original): A method for cooling comprising the steps:

- (a) applying a bias voltage to an emitter electrode;
- (b) placing a collector electrode a distance  $d_0$  from the emitter electrode; and
- (c) placing an insulator layer in contact with the collector electrode and a distance  $d_1$  from the emitter electrode, wherein  $d_1$  is greater than zero;

whereby electrons tunneling from the emitter electrode to the collector electrode thereby cool the emitter electrode.

Claim 16 (original): The method of claim 15 in which  $d_0$  is in the range of 10 - 200Å.

Claim 17 (original): The method of claim 15 in which  $d_1$  is in the range of 5 - 50Å.

Claim 18 (original): The method of claim 15 in which the insulator layer comprises a metal oxide.

Claim 19 (original): The method of claim 18 in which the metal oxide is aluminum oxide.

Claim 20 (original): The method of claim 15 in which the emitter electrode comprises a metal.

Claim 21 (original): The method of claim 15 in which the collector electrode comprises a metal.